Roll No: ----------

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, April, 2017

Program/course: B Tech Civil Engineering — **Semester – VIII**
Subject: Advanced Transportation Engineering — **Max. Marks : 100**
Code : IFEG - 485 — **Duration : 3 Hrs**
No. of page/s: 01

No code books are allowed in the exam hall

Section A: Attempt all questions

1. Differentiate between main tunnel and pilot tunnel [5]
2. Mention the uses of polymer modified bitumen. [5]
3. Differentiate Spalling and traverse crack. [5]
4. Write a note on traffic bound macadam [5]

Section B: Attempt all questions

5. Explain the salient features of any one railway tunnel in India and an under-water tunnel outside the country [10]
6. Explain clearly the circumstances under which you would prefer a WBM road, BM road and CC road and why? [10]
7. Write a note on cement concrete lining for a tunnel. [10]
8. Explain pavement evaluation by deflection [10]

Section C: Attempt all questions

9. Explain the methods of strengthening damaged pavements [10]
10. The laying temperature is 20^{o} C and the maximum slab temperature in summer is 60 ^{o}C. The coefficient of thermal expansion of concrete is 10 x 10-6 mm/mm / ^{o}C and Bradbury's coefficient is 0.5, Calculate the edge warping stresses [10]

$$S_{te} = \frac{E \alpha t C}{2}$$

Hint:

11. Write short notes on:
    (a) Tunnels for carrying water [4]
    (b) D section [3]
    (c) Horse-shoe section [3]
12. Enumerate the components and aspects of a tunnel which need maintenance [10]

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Section A: Attempt all questions

1. Write a note on the investigations required for a tunneling job [5]
2. What are the critical load positions? [5]
3. What are alligator cracks? [5]
4. A pavement designer has arrived at a design traffic of 100 msa for a newly developed NH as per IRC 37, design life = 15 years, Commercial vehicle count before construction is 4500 veh/ day, annual traffic growth rate is 8 percent. Calculate VDF [5]

Section B: Attempt all questions

5. Define mucking. Mention the different methods of mucking process and explain any one method [10]
6. Explain the different types of mountings used for drilling equipment [10]
7. Why are joints provided in CC road? Explain about expansion and contraction joints. [10]
8. Write short notes on (in case of hill roads)
   (a) Retaining wall[4]
   (b) Breast wall[3]
   (c) Parapet[3]

Section C: Attempt all questions

9. Write short notes on
   (a) Natural ventilation [3]
   (b) Ducts for exhaust [3]
   (c) Noise control pollution in tunnels [4]
10. What are the different types of maintenance explain their need uses in different types of pavements [10]
11. Discuss the causes for the disintegration of flexible pavements [10]

12. Design a flexible pavement for the following data [10]

Using IRC: 37 - 1984 "Guidelines for the Design of Flexible Pavements" and the following data, choose the total thickness of the pavement.

No. of commercial vehicles when construction is completed= 2723 veh/day

Annual growth rate of the traffic = 5.0%

Design life of the pavement = 10 years

Vehicle damage factor = 2.4

CBR value of the subgrade soil = 5%

Data for 5% CBR value

No. of Standard Axles, msa	Total Thickness, mm
20	620
25	640
30	670
40	700